

Restraint reduction in mental healthcare: A systematic review.

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Abstract

Restraint has negative health-related and financial consequences. Policies calling for restraint reduction in mental healthcare have emerged internationally, putting increasing pressure on healthcare providers to reduce its use. A systematic review of 60 studies of restraint reduction in mental healthcare from 2004 to 2014 was conducted. Interventions were mostly multi-faceted. The majority cited reduced restraint; however methodological inconsistencies limit conclusions. Whilst this review highlights interventions that will be informative to healthcare providers, this area demands further research. This is essential not only due to political pressure, but because we as healthcare providers should be striving towards more humane mental healthcare.

Keywords: Mental health, mental illness, physical intervention, restraint, restraint reduction.

Restraint reduction in mental healthcare: A systematic review

Introduction

Restraint has a long history in mental healthcare. According to established international definitions restraint is the intentional restriction of a person's voluntary movement or behaviour (Counsel & Care UK, 2002; Royal College of Nursing, 2008). Physical restraint (also called manual restraint or physical intervention) refers to any direct physical contact where the intervener's intention is to prevent, restrict, or subdue movement of the body of another person (Department of Health, 2014) and involves one or more members of staff holding the person, moving the person, or blocking their movement to stop them leaving (Royal College of Nursing, 2008). In the UK, it has been estimated that 12% of mental health patients experience physical restraint (CQC, 2011), but its use varies both within the UK (Mind, 2013) and internationally (e.g. Raboch et al., 2010).

It has been argued that there are circumstances when the use of physical restraint is necessary for maintaining safety; however its use has negative physical, psychological and financial consequences. Research demonstrating robust benefits of physical restraint is very limited, but a multitude of research has identified complications associated with its use and questions have been raised as to whether restraint reflects humane treatment of patients (e.g. Strout, 2010). Both patients and staff report feeling distressed, stressed, fearful, angry, anxious, and reminded of previous trauma (e.g. Bigwood & Crowe, 2008; Bonner, Lowe, Rawcliffe & Wellman, 2002; Kontio et al., 2012; Sequeira & Halstead, 2004; Strout, 2010; Stubbs, Yorston, & Knight, 2008). Patients and staff also report that it is damaging to the therapeutic relationship, damaging to patient relationships with services, and incompatible with caring values (e.g. Chuang & Huang, 2007; Steinert et al., 2007; Wynn, 2004). Negative physical consequences for patients include lacerations, asphyxiation, thrombosis and even death (e.g. Department of Health and Human Services, 2006; Hem, Steen, & Opjordsmoen,

2001; Mohr, Petti & Mohr, 2003; Paterson et al., 2003; Sallah et al., 2003; Weiss, Altimari, Blint, & Megan, 1998). Injuries amongst staff are also well-documented (e.g. Paterson & Duxbury, 2007; Stubbs, 2009; Stubbs et al., 2008; Weiss et al., 1998) and the cost of restraint-related injuries, lost working hours, and staff demoralisation are staggering (LeBel & Goldstein, 2005).

Guidelines and policies calling for a reduction in restraint have emerged internationally in recent years (e.g. Australian Council on Healthcare Standards, 2008; Curie, 2005; LeBel, 2008; MSSS, 2002a; 2002b; Servicio Andaluz de Salud, 2010). In the UK the Department of Health (2014) state that physical restraint should be used as a last resort only and that services should develop and implement restraint reduction programmes. These guidelines confer increased responsibilities on National Health Service (NHS) Trusts to reduce restraint, but do not provide evidence-based guidance on how to achieve this in practice. It is therefore essential for an up-to-date systematic review of restraint reduction interventions to be available to mental healthcare providers, both in the UK and internationally.

The aim of this paper is to systematically review studies of restraint reduction in mental healthcare from 2004 to 2014, covering initiatives aimed at reducing physical, mechanical or chemical restraint. In addition to physical restraint, which has already been defined, mechanical restraint refers to the use of restraining straps, belts, or other equipment to restrict movement (e.g. Bak, Brandt-Christensen, Sestoft & Zoffman, 2012; Stewart et al. 2010) and chemical restraint is when medication is prescribed *pro re nata* (PRN: as needed) as a reaction to agitated or aggressive behaviour for the purposes of sedation (e.g. Currier & Allen, 2000; Donat, 2005). Whilst restrictive practice encompasses many practices such as seclusion, physical restraint, mechanical restraint, chemical restraint, long-term segregation, compulsory admissions and psychosocial restraint (e.g. RCN, 2013), we have chosen to focus

on physical, mechanical and chemical restraint as it is not feasible to address all restrictive practice in one review given the increasing volume of research in this field (for a recent review of interventions aimed at reducing compulsory admissions see de Jong et al., 2016). The present review was conducted as part of a larger funded UK initiative called PROMISE (PROactive Management of Integrated Services and Environments) being conducted within the Cambridgeshire and Peterborough NHS Foundation Trust (CPFT). Within CPFT seclusion is an extremely rare occurrence with only one seclusion suite available in the whole Trust. Therefore, in order to keep the review focused the decision was made to focus only on restraint and not on seclusion due to increased relevance to the PROMISE project funding brief.

Method

The review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Moher, Liberati, Tetzlaff, & Altman, 2009). Electronic databases (ScienceDirect, PubMed, PsychINFO, PsychArticles, MEDLINE, CINAHL, and Psychology and Behavioral Sciences Collection) were searched for research written in English and published between January 2004 and December 2014. An additional search was conducted in October 2017 in order to identify any further research published since the completion of the review up until that time. Searches included combinations of the following words: ‘restrain*’, ‘physical intervention*’, ‘mental health’, ‘mental illness’, ‘psychiatr*’, ‘reduc*’, ‘decrease*’, ‘eliminate*’, ‘lessen*’. Further relevant references from research articles obtained were followed-up. The inclusion criteria were that the article involved an evaluation of an intervention aimed at reducing physical, mechanical or chemical restraint in a mental health setting, and reported on the impact of the intervention on restraint use. Editorials, letters to editors and commentaries were excluded. Studies which only assessed the impact of interventions on rates of seclusion (i.e. the isolation of a patient

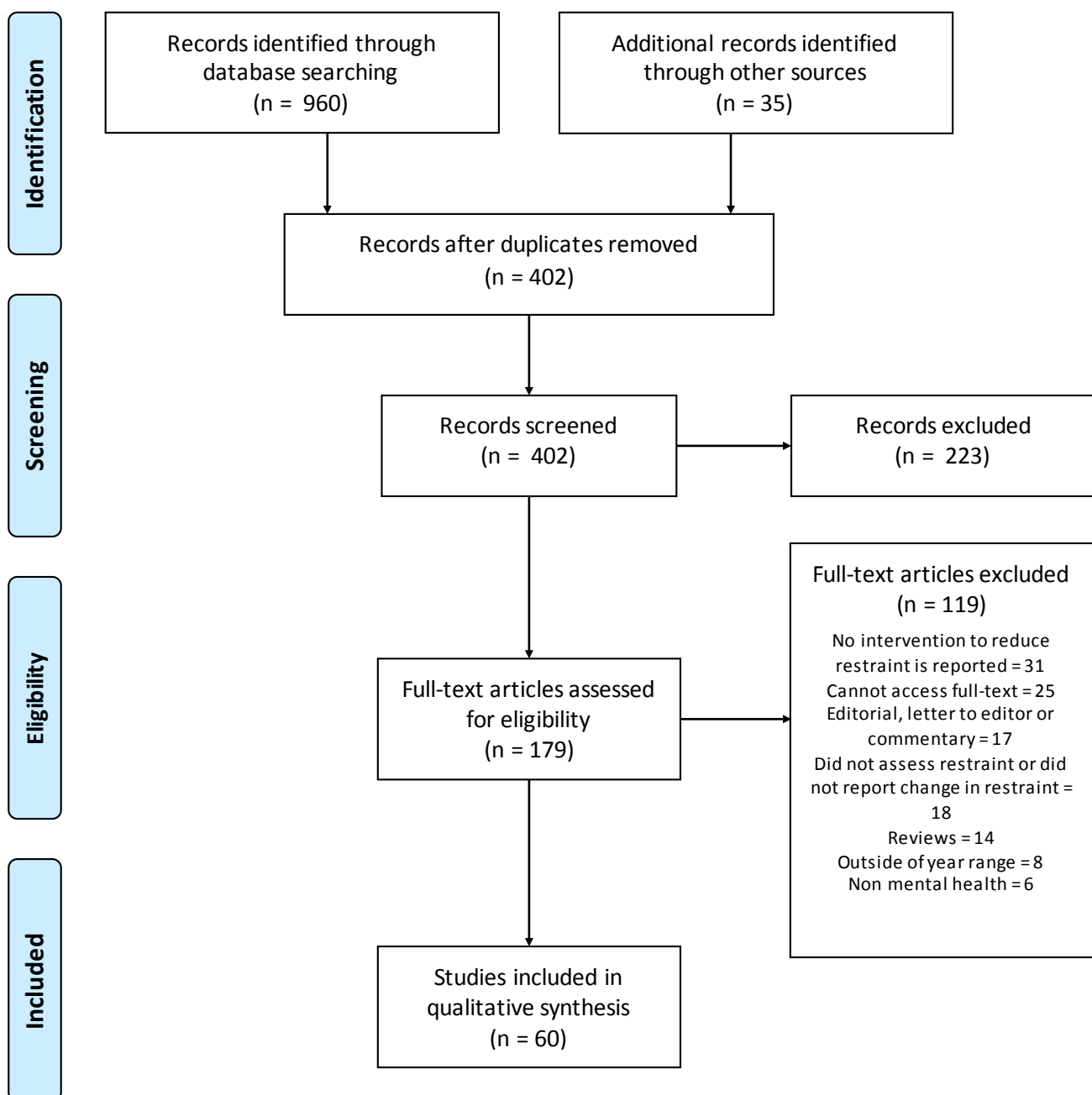
in a locked room) were also excluded as this was outside the scope of the current review.

Whilst restraint and seclusion are sometimes used interchangeably in the literature, seclusion is a separately defined procedure to restraint (e.g. Ministry of Health, 2010; Royal College of Nursing, 2013; NICE, 2015), having been defined as the supervised confinement of a person alone in a room which is locked and cannot be freely exited, only to be used for the containment of severe behavioural disturbance that is likely to cause harm to others (e.g. Mental Health Act, 1983; Human Rights Working Group on Restraint and Seclusion, 2005; Mental Welfare Commission for Scotland, 2014). Where full-texts could not be accessed authors were contacted via email with a request for full study details.

Figure 1 outlines the PRISMA search strategy. Titles and abstracts of records were initially screened for relevance, then the remaining full-text articles were assessed in full for eligibility. This led to the inclusion of 60 studies. Fourteen reviews were also identified. The vast majority of these reviews only included papers evaluating either: a specific type of restraint or related procedure (Bak et al., 2012; Gaskin, Elson & Happell, 2007; Stewart et al., 2010); a specific type of intervention (Champagne, 2004; Donat, 2005; Muskett, 2014); or restraint reduction interventions amongst a specific sub-section of the mental health population (De Hert, Dirix, Demunte & Correll, 2011; Delaney, 2006; Valenkamp, Delaney & Verheij, 2014). Out of the remaining reviews, Johnson (2010) reviewed 46 papers covering restraint, seclusion, aggression and violence reduction initiatives between 1989 and 2009; Scanlan (2010) only reviewed 29 papers covering both seclusion and restraint reduction initiatives between 1989 and 2008; and Steinert et al. (2010) only reviewed six articles due to extremely stringent inclusion criteria. Out of the two remaining narrative reviews one focused on specific international implementations of restraint reduction programmes, only citing eight studies (LeBel et al., 2014), whilst the other focused on American regulation and policy changes (LeBel, 2008). Furthermore, a cursory examination of the literature suggested many

more studies had been completed since the publication of these reviews and were worth adding. Therefore, an up-to-date comprehensive systematic review of restraint reduction initiatives across mental health services is lacking, and the present review fills this gap. It was not feasible to conduct a meta-analysis because the studies were too heterogeneous in terms of settings, definitions of restraint, outcome measures and follow-up timescales. Suggestions for how this could be ameliorated in future studies are provided in the discussion.

Figure 1: PRISMA search strategy



Contextual background

Details of the 60 included studies are provided in Table 1. As can be seen in Table 1, the majority of the identified studies were conducted in North America ($n=44$). The remaining studies were conducted in the UK ($n=4$), Finland ($n=4$), Australia ($n=3$), Spain ($n=2$), Israel ($n=1$), Italy ($n=1$), and Switzerland ($n=1$). Settings comprised psychiatric inpatient hospital settings, psychiatric residential settings, psychiatric intensive care units (PICUs), and psychiatric emergency departments (EDs). Thirteen studies were conducted in child and/or adolescent settings, ten were in adult settings, and eight were across child, adolescent and adult settings (the remaining articles did not provide the age range). The largest proportion did not specify and/or define what type of restraint they had assessed (see Table 1). In a number of papers the authors stated that they assessed physical restraint but their definitions aligned with the widely accepted definitions of mechanical restraint. Others used the terms physical and mechanical restraint interchangeably. These inconsistencies cause problems in assessing whether studies which refer to physical restraint but do not define it, have assessed physical or mechanical restraint. Such studies have been classed as 'not specified' in Table 1. The majority of studies that specified/defined the type of restraint had assessed mechanical restraint ($n=16$).

Choice of outcome measures varied between actual or mean number of restraint episodes, percentage reduction in restraint, actual or mean number of hours patients were restrained, actual or mean number of patients restrained, percentage of patients restrained, and number of months until restraint-free. Chosen post-intervention time scales also varied widely from six hours to 14 years (see Table 1).

The following subsections outline the interventions evaluated in the 60 included studies, according to the type of intervention. The interventions are divided into two main categories: multi-faceted approaches and specific interventions.

Table 1: Details of the 60 studies reviewed

Authors	Country	Setting and age group	Type of restraint assessed	Intervention	Outcomes	Follow-up timescale	Study design	Findings
MULTI-FACETED INTERVENTIONS								
Huckshorn (2004)	America	Psychiatric hospitals across 8 American states	Not specified/defined	NASMHPD six core strategies	No. of patients restrained, no. of restraint episodes, percentage of patients restrained	Unspecified	Descriptive data pre/post-intervention without statistical comparison between time points, or to a control group	7 of 8 states had fewer patients restrained; 5 of 7 had fewer restraint events. Percentage of patients restrained reduced by as much as 62%. No. of restraints in a month reduced by as much as 68%.
Lewis et al (2009)	America	4 units of a psychiatric clinic	Not specified/defined	NASMHPD six core strategies	Hours restrained, percentage decrease in restraint use	3 years	Descriptive data pre/post-intervention without statistical comparison between time points, or to a control group	The 4 units decreased in restraint usage from 20-97% over the years 2004 to 2007. However, this coincided with an increase in minor injuries.
Barton et al (2009)	America	Behavioural health unit in a community hospital	Not specified/defined & chemical	NASMHPD six core strategies	No. of restraint episodes	2 years	Descriptive data pre/post-intervention without statistical comparison between time points, or to a control group	Pre-implementation yearly restraints varied from 3 to 19. There were 4 restraints the year of implementation (2005), 3 the following year, 0 the following year. Decrease in chemical restraint by 22% per patient per day.
Sarofin et al (2012)	America	Child & adolescent psychiatric hospital	Mechanical & physical	NASMHPD six core strategies	No. of restraint events, percentage decrease in restraint use	6 years	Descriptive data pre/post-intervention without statistical comparison between time points, or to a control group	Mechanical restraints reduced by 99.8% from 485 in 2005 to one in 2011. Physical restraints decreased by 76% from 3033 in 2005 to 730 in 2011.
Chandler (2012)	America	Psychiatric inpatient unit	Mechanical	NASMHPD six core strategies	No. of restraint episodes	6 years	Descriptive data pre/post-intervention without statistical comparison between time points, or to a control group	Incidents reduced by 50% from the year 2005 (10 incidents) to 2011 (five incidents).
Azeem et al (2011)	America	State psychiatric hospital (adults and children)	Mechanical	NASMHPD six core strategies	No. of restraint episodes	6 months	Descriptive data pre/post-intervention without statistical comparison between time points, or to a control group	Restraint usage amongst youths increased from 20 six months pre-implementation of the six core strategies to 25 six months post-implementation.

Authors	Country	Setting and age group	Type of restraint assessed	Intervention	Outcomes	Follow-up timescale	Study design	Findings
Wieman et al (2014)	America	43 inpatient psychiatric facilities	Not specified/defined	NASMHPD six core strategies	Proportion of patients restrained, hours restrained	Unspecified	Statistical comparison between pre/post-implementation restraint rates, no control group	Proportion of patients restrained significantly reduced by 30% over an unspecified time. Restraint hours (non-significantly) reduced by 55%.
Putkonen et al (2013)	Finland	Wards for patients diagnosed with schizophrenia	Not specified/defined	NASMHPD six core strategies	Percentage of total patient time spent in restraints, restraint time per 100 patient days	1 year	Randomised controlled trial (RCT)	Percentage of total patient time in restraints significantly reduced from 30% to 15% across 2 intervention wards (significantly greater reduction than on control wards). Restraint time decreased from 110 to 56 hours per 100 patient days (compared to an increase on control wards).
Wale et al (2011)	America (New York)	Psychiatric hospitals	Mechanical & physical	NASMHPD six core strategies	No. of restraint episodes, mean duration per episode	2 years	Statistical comparison between pre/post-implementation restraint rates, no control group	Non-significant 28% reduction in restraint use from 2007 to 2009.
Ashcraft & Anthony (2008)	America	2 Recovery Innovations crisis centres	Mechanical & chemical	No Force First	Time until restraint-free month, percentage of patients restrained	4 years	Descriptive data without statistical analysis or control group	The larger of the 2 centres took 31 months to achieve a restraint-free month. The smaller centre achieved a restraint-free month after 15 months & decreased its yearly staff injuries from 15 to 5. There were no restraints in the year prior to publication in 1 of the centres, & chemical restraint was administered to only 2.5% of patients.
Ashcraft et al (2012)	America	1 Recovery Innovations crisis centre	Mechanical & chemical	No Force First	Percentage of patients restrained	2 years	Descriptive evaluation without statistical analysis or control group	Continued follow-up of 1 crisis centre previously evaluated (Ashcraft & Anthony, 2008). Over a 2-year period 0.45% of patients received chemical restraint. No other restraint was used.
LeBel et al (2004)	America	Child unit, mixed child/adolescent unit, adolescent unit	Not specified/defined	Area wide policy change (Massachusetts DMH)	No. of restraint episodes, percentage reduction in restraint use	22 months	Descriptive data pre/post-intervention without statistical comparison between time points, or to a control group	No. of episodes decreased by 72.9% (child unit), 59% (mixed unit) & 47.4% (adolescent unit). 27% reduction in staff injuries & 12% reduction in patient injuries. Use of chemical restraint decreased in the child, adolescent & mixed units by 51.5%, 38.4% and 66% respectively.

Authors	Country	Setting and age group	Type of restraint assessed	Intervention	Outcomes	Follow-up timescale	Study design	Findings
LeBel & Goldstein (2005)	America	Adolescent inpatient service	Mechanical, physical & chemical	Area wide policy change (Massachusetts DMH)	No. of restraint episodes	3 years	Descriptive data pre/post-intervention without statistical comparison between time points, or to a control group	From 2000 to 2003 there was a 91% decrease in episodes from 3,991 to 373 & a 60% reduction in injuries.
Khadivi et al (2004)	America	3 acute inpatient psychiatric units	Not specified/defined	Area wide policy change (JCAHO)	No of restraint episodes, percentage reduction in restraint use	1 year	Statistical comparison between pre/post-implementation restraint rates, no control group	Episodes of restraint significantly decreased by 52% from 310 pre- to 148 post-implementation. However, assaults on staff & patients significantly increased.
Pollard et al (2007)	America	Secure mental health unit	Not specified/defined	Area wide policy change (JCAHO)	No. of restraint hours	18 months	Statistical comparison between pre/post-implementation restraint rates, no control group	Statistically significant reduction in the no. of restraint hours from pre- to post-implementation. Data collected for 46 months (implementation at month 28).
Keski-Valcama et al (2007)	Finland	Adult psychiatric hospitals	Mechanical	Area wide policy change (Revised Finnish Mental Health Act)	No. of patients restrained	14 years	Retrospective restraint data review over a specified one week period in 1990, 1991, 1994, 1998 & 2004	Total no. of mechanically restrained patients was the lowest in 2004 (36 compared to 75 in 1990) but the decline was not linear over the years.
Ulla et al (2012)	Finland	Adolescent psychiatric hospitals	Mechanical	Area wide policy change (Revised Finnish Mental Health Act)	No. of patients restrained	7 years	Retrospective restraint data review from 1996 to 2003	There was not a linear decline in the number of patients restrained each year. There was an increase in the no. of patients restrained each year from 1996 to 1999.
Sees (2009)	America (Minneapolis)	Locked psychiatric unit	Not specified/defined	Area wide policy change (HCFA guidelines)	No. of patients restrained	2 years	Statistical comparison between pre/post-implementation restraint rates, no control group	No. of patients restrained significantly decreased from 226 two years pre-implementation to 106 two years post-implementation.
Guzman-Parra et al (2014)	Spain	Adult psychiatric ward	Mechanical	Area wide policy change (Servicio Andaluz de Salud (2010) Policy)	No. of patients restrained, total no. of restraints	7 years	Descriptive data pre/post-intervention without statistical comparison between time points, or to a control group	No. of patients restrained reduced from 100 to 82. However, total no. of restraints increased from 148 to 164.
Markwell (2005)	America (Chicago)	Community hospital	Not specified/defined	Restraint reduction task force; staff contest (suggestions for restraint alternatives); restraint reduction kit; staff training (on restraint alternatives)	Mean no. of patients restrained per 100 adjusted patient days	4 years	Descriptive data pre/post-intervention without statistical comparison between time points, or to a control group	Data showed a 51% reduction in the second year post-implementation.

Authors	Country	Setting and age group	Type of restraint assessed	Intervention	Outcomes	Follow-up timescale	Study design	Findings
Smith et al (2005)	America (Pennsylvania)	9 state hospitals	Mechanical	Changes to: leadership, advocacy efforts, policy, psychiatric emergency response teams, unit size, patient-to-staff ratios, incident management, second-generation antipsychotics, quantity/quality of treatment	Restraint episodes per 1000 patient days	11 years	Descriptive data on restraint use from 1990 to 2000, no statistical comparison between time points or to a control group	The rate of mechanical restraints decreased from 6.4 episodes per 1000 patient days in 1991 to 1.2 in 2000.
LaFond (2007)	America (Ohio)	Psychiatric hospital	Not specified/defined	Began with premise that restraint is a treatment failure; implementation of post-restraint debriefing processes; improvement of nursing assessments; staff crisis intervention training	No. of restraint episodes	4 years	Descriptive data on restraint use from 2002 to 2006, no statistical comparison between time points or to a control group	Restraints reduced yearly from 2002 (83 incidents) to 2006 (38 incidents).
Witte (2007)	America (Michigan)	Child & adolescent mental health unit	Not specified/defined	Formation of task force, redesigning of crisis situation paperwork, staff verbal skills training, daily treatment plans, staff consulting with each other prior to approaching a patient in crisis, changes to unit routine, increased staff reflection on their interactions with patients	No. of restraint episodes	1 year	Descriptive data pre/post-intervention without statistical comparison between time points, or to a control group	Restraints decreased from 240 in the year pre-implementation (2006) to 5 in the year post-implementation (2007). This did not coincide with an increase in injuries or PRN medication.
Sclafani et al (2008)	America (New Jersey)	Psychiatric hospital	Not specified/defined	Identifying & working with high restraint patients; working with unit staff to develop modified ward structures/routines; building & using emotional relationships; staff training; ward meetings; person-centred approaches; positive reinforcements; strength-based treatment.	Monthly restraint episodes	2 years	Descriptive data pre/post-intervention without statistical comparison between time points, or to a control group	Monthly episodes of restraint reduced from 29 in November 2003 to zero in February 2005.
Beezhold et al (2010)	UK	Inpatient psychiatric service	Not specified/defined	Introduction of dedicated inpatient psychiatrist, replacement of weekly ward rounds with daily multidisciplinary care & discharge planning meetings, increased roles for nursing staff in decision-making & patient contact	Percentage decrease in restraint use	Unspecified	Comparison to control ward	Restraints decreased by 28%, compared to a 12% increase on a control ward.
Sivakumaram et al (2011)	Australia	Mental health unit	Not specified/defined	Changes to physical environment (e.g. more natural light & open areas, activities room); leadership initiatives (e.g. better communication pathways; mentoring & support; de-escalation training; accountability & debriefing); multidisciplinary staff involvement; & documentation changes	No. of restraint episodes, no. of patients restrained	5 years	Descriptive data presented graphically	Descriptive data presented graphically showed a reduction in the no. of restraints & the no. of patients restrained from 2005 to 2010.

Authors	Country	Setting and age group	Type of restraint assessed	Intervention	Outcomes	Follow-up timescale	Study design	Findings
Di Lorenzo et al (2014)	Italy	Psychiatric ward	Mechanical	Changes in ward staff, increase in the no. of nurses per shift, ward relocation, more restricted guidelines for restraint application	No. of restraint episodes	8 years	Descriptive data over eight years (2005-2012), no statistical comparison between time points or to a control group	No. of restraints reduced from 2007 to 2008 (coinciding with a change in ward staff); rapid reduction from 2008 to 2009, coinciding with an increase in the no. of nurses per shift & ward relocation; rapid reduction from 2010 to 2011 (more restricted guidelines for restraint implemented). No. of mechanical restraints reduced steadily from the year 2005 (n=383) to 2014 (n=16).
Espinosa et al (2014)	America (New York)	Large medical centre with inpatient psychiatric services for children, adolescents & adults	Mechanical	Written & easily accessible schedules of activities; unstructured time being filled with activities (e.g. high tea); staff identification photo boards; frequent reminders for staff to prioritise time with patients; clearly written rights & expectations for patients; avoiding criticism, hostility & over-involvement; emphasis on positive communications; taking vital signs after patients were awake (instead of at 6am); & the introduction of comfort rooms.	No. of restraint episodes	9 years	Descriptive data from 2005 to 2014, no statistical comparison between time points or to a control group	No. of mechanical restraints reduced steadily from the year 2005 (n=383) to 2014 (n=16).
D'Orio et al (2004)	America (Atlanta)	Psychiatric emergency service	Not specified/defined	Development of a crisis response team; staff retraining on prevention & management of aggression; staff taught restraint was only to be used as a last resort.	No. of restraint episodes, percentage decrease in restraint use	9 months	Statistical comparison between pre/post-implementation restraint rates, no control group	Restraint reduced significantly by 39%.
McCue et al (2004)	America (New York)	Large adult psychiatric hospital	Mechanical	Identification of restraint-prone patients; patient education (stress/anger management); staff education (on alternatives to restraint); development of a crisis response team; daily review of all restraints; an incentive system for staff.	No. of restraint episodes	3 years	Statistical comparison between pre/post-implementation restraint rates, no control group	Significantly decreased restraint use from 4 years pre- to 3 years post-implementation. However, there was a significant increase in patient-to-staff assaults.
Jonikas et al (2004)	America (Illinois)	3 psychiatric units (2 adult units & 1 adolescent unit)	Not specified/defined	Advance crisis management plans which helped patients to determine personal stress triggers & strategies; non violent crisis intervention which taught staff about factors that precipitate crises & non violent methods for managing aggression.	No. of restraint episodes, percentage decrease in restraint use	6 months	Statistical comparison between pre/post-implementation restraint rates, no control group	Two quarters post-implementation an adolescent unit experienced a 98% decrease, an adult unit a 99% decrease, & another adult unit a 49% decrease. The overall decrease was statistically significant.

Authors	Country	Setting and age group	Type of restraint assessed	Intervention	Outcomes	Follow-up timescale	Study design	Findings
Hellerstein et al (2007)	America (New York)	Psychiatric hospital	Mechanical	Restricted length of restraint to 2 hours; staff education; staff discussions on restraint alternatives; improved staff/patient communication; relaxed practice with off-unit privileges; use of a coping questionnaire to assess patient preferences for dealing with agitation.	Mean no. of patients restrained per month	67 months	Statistical comparison between pre/post-implementation restraint rates, no control group	Mean number of patients restrained non-significantly reduced from 0.35 to 0.32 patients per month from 20 months pre- to 67 months post-intervention. Patient-related staff injuries significantly decreased from a mean of 0.7 per month, to 0.18.
Borckhardt et al (2011)	America	5 psychiatric inpatient units	Not specified/defined	Trauma-informed care training; changes in rules & language; patient involvement in treatment planning; changes to the physical environment.	No. of restraint episodes, percentage reduction in restraint use	3 months	Statistical comparison between pre/post-implementation restraint rates, each unit randomly assigned to implement the intervention components in a different order, each unit served as its own control	Entire initiative associated with a significant 82.3% reduction in use of restraint. Change to the physical environment was the only intervention uniquely & significantly associated with a restraint reduction.
Godfrey et al (2014)	America	2 units within a psychiatric hospital	Mechanical	Staff received de-escalation training, a crisis response team was formed, a policy change requiring prior approval for the use of mechanical restraint was implemented, & provision of feedback and quality monitoring was initiated.	No. of restraint episodes, percentage reduction in restraint use	3 years	Statistical comparison between pre/post-implementation restraint rates, no control group	Following staff de-escalation training & formation of response team, a significant reduction in the use of restraints was observed on both wards, with one ward eliminating its use. With the additional policy change, a further significant reduction was seen on the other ward. Did not coincide with increase in assaults or injuries.
Bowers et al (2006)	UK (London)	2 psychiatric wards	Physical & chemical	Intervention was based on a model whereby psychiatric philosophy, moral commitments, cognitive-emotional self-management, technical mastery, teamwork, & organisational support were thought to lead to: compassion, emotional equilibrium, & effective structure; which were then thought to decrease restraint.	Mean no. of restraints per shift	1 year	Statistical comparison between pre/post-implementation restraint rates, no control group	Mean no. of restraints per shift did not significantly reduce from a 3 month baseline period to the year the implementation occurred.
Bowers et al (2008)	UK (London)	8 psychiatric wards (3 intervention wards, five control wards)	Physical & chemical	See Bowers et al (2006)	Percentage reduction in restraint use	Not known	Statistical comparison between intervention & control wards	Chemical restraint decreased by 21% & physical restraint by 46% on 3 intervention wards, but did not significantly differ from control wards.

Authors	Country	Setting and age group	Type of restraint assessed	Intervention	Outcomes	Follow-up timescale	Study design	Findings
SPECIFIC INTERVENTIONS								
Hallman et al (2014)	America (Michigan)	Child & adolescent psychiatric unit	Not specified/defined	Staff training: MBSR (topics included: waking up from autopilot, body scanning, refraining from judgement, using breathing as a stress reliever & befriending yourself)	No. of restraint episodes	8 weeks	Descriptive data pre/post-intervention without statistical comparison between time points, or to a control group	Restraints decreased from 30 (over 8 weeks pre-training) to 10 (over 8 weeks post-training).
Laker et al (2010)	UK	PICU	Physical & chemical	Staff training: de-escalation & restraint training	No. of restraint episodes, proportion of patients restrained	6 months	Statistical comparison between pre/post-implementation restraint rates, no control group	No. of chemical restraints increased from 45 pre- to 51 post-training. Proportion of patients chemically restrained (non-significantly) reduced from 39% to 36%. Physical restraints slightly increased from 89 to 91. Proportion of patients physically restrained significantly reduced from 79% to 66%.
Chandler (2008)	America	Psychiatric unit	Mechanical	Staff & patient training/education: trauma-informed training	No. of restraint episodes	5 years	Descriptive data over 5 years (2003-2008), no statistical comparison between time points or to a control group	Linear decline in restraint use yearly from 2003 to 2008, falling from 26 restraints to 3.
Moore (2008)	America (New Jersey)	3 mental health units (child & adolescent, & adult)	Not specified/defined	Staff training: NVCIP training (empathy)	Percentage reduction in restraint use, restraint minutes per patient care day	1 year	Descriptive data pre/post intervention without statistical comparison, or to a control group	40% reduction in restraint in the year following training (2007), and a further 30% reduction in the first quarter of 2008.
Kontio et al (2014)	Finland	Psychiatric hospital	Mechanical	Staff training: e-learning consisting of various modules (legal & ethical issues, behaviour-related factors, therapeutic relationship & self-awareness, teamwork & integrating knowledge with practice). Collaborative Problem Solving (CPS)	No. of episodes per 1000 occupied bed days; duration of episodes	Not known	Cluster randomised trial	Did not lead to significant reductions in the number of mechanical restraints, but duration of episodes significantly reduced.
Greene et al (2006)	America	Child & adolescent inpatient unit	Mechanical, physical & chemical		No. of restraint episodes	15 months	Statistical comparison between pre/post-implementation restraint rates, no control group	Statistically significant decrease in restraint from 281 episodes over nine months pre-implementation to one in a 15 month post-implementation period. Staff/patient injuries significantly decreased.

Authors	Country	Setting and age group	Type of restraint assessed	Intervention	Outcomes	Follow-up timescale	Study design	Findings
Regan et al (2006)	America	See Greene et al (2006)	Mechanical, physical, & chemical	CPS	No. of restraint episodes	5 years	Longer-term follow-up from Greene et al (2006)	Up until 2006 the same unit as Greene et al (2006) had not used any mechanical restraints since Nov 2001 or chemical restraints since Feb 2002. The unit reduced brief physical holds from >100 a month to 10 a month by the end of 2003, & significantly decreased in serious staff injuries.
Martin et al (2008)	America (Connecticut)	Children's psychiatric inpatient unit	Mechanical	CPS	No. of restraint episodes	4 years	Descriptive data pre/post-intervention without statistical comparison between time points, or to a control group	Reduction from 263 restraints in 2003 to seven in 2007.
Jani et al (2011)	America	Child & adolescent mental health unit	Not specified/defined	CPS	No. of restraint episodes	4 years	Statistical comparison between pre/post-implementation restraint rates, no control group	Statistically significant restraint reduction from 521 incidents in 2005 to just one in 2009.
Teitelbaum et al (2007)	Israel	Closed psychiatric wards	Not specified/defined	Sensory modulation	No. of restraint episodes	Not known	Statistical comparison between pre/post implementation & between intervention/ control units	Statistically significant reduction in the no. of restraints in the intervention unit compared to the control unit.
Cummings et al (2010)	America (New Hampshire)	Acute psychiatric facility for children & adults	Not specified/defined	Sensory modulation	No. of restraint episodes, duration of restraint episodes	9 months	Statistical comparison between pre/post implementation & between intervention/ control unit	Significant reduction in the frequency & duration of restraint episodes over a nine-month period.
Bisconer et al (2006)	America	Psychiatric hospital	Chemical	Behavioural intervention	No. of restraint episodes	39 months	Single-subject research design with baseline & intervention phases	From pre- to post-implementation there was a decrease in the frequency of restraints, PRN medication & staff injuries.
Dean et al (2007)	Australia	Child & adolescent mental health unit	Physical & chemical	Behavioural intervention	No. of restraint episodes	6 months	Statistical comparison between pre/post-implementation restraint rates, no control group	Significant reduction in no. of physical restraints & no. of staff & patient injuries from 6 months pre- to 6 months post-implementation.
Childs & Price (2007)	America (Texas)	Violent neuro-psychiatric patients at a max. security hospital	Chemical & unspecified	Medical intervention: Daily cranial electrotherapy stimulation	No. of restraint episodes	3 months	Statistical comparison between pre/post-implementation restraint rates, no control group	Significant 40% reduction in episodes of an unspecified form of restraint, & a statistically significant 42% reduction in the use of PRN.

Authors	Country	Setting and age group	Type of restraint assessed	Intervention	Outcomes	Follow-up timescale	Study design	Findings
Pascual et al (2007)	Spain	Agitated psychotic patients at emergency psychiatric service	Not specified/defined	Medical intervention: 20mg Olanzapine	No. of patients restrained, percentage of patients restrained	6 hours	20mg Olanzapine group compared to conventional oral therapy group	30% required physical restraint pre-medication, which decreased throughout the 6 hours in both groups. At the final time point, only 5 patients treated with olanzapine (13%) and 9 patients (22%) treated with standard therapy were restrained.
Damsa et al (2006)	Switzerland	Psychiatric emergency department	Chemical	Monitoring the use of restraint	No. of restraint episodes	3 months	Statistical comparison between pre/post-implementation restraint rates, no control group	Statistically significant 27% decrease in the no. of injections in the 3-month observational period compared to the previous 3 months.
Friedman et al (2012)	America	Psychiatric hospital	Chemical	Monitoring the use of restraint	No. of restraint episodes	2 years	Statistical comparison between pre/post-implementation restraint rates, no control group	From Sept 2008 to Dec 2010 monthly administrations decreased from 642 to 240. Statistically significant decreases found yearly, monthly & weekly.
Prescott et al (2007)	America	Psychiatric hospital for adults, adolescents & children	Mechanical & physical	Post-incident review	No. of restraint episodes; no. of patients restrained	3 weeks	Statistical comparison between pre/post-implementation restraint rates, no control group	Mechanical restraints decreased by 36% (77 to 49). No. of patients mechanically restrained declined by 12% (25 to 21). No of physical restraints decreased by 44% (79 to 44). No. of patients physically restrained decreased by 21% (28 to 22).
Swanson et al (2008)	America (North Carolina)	Psychiatric Advance Directive completers	Not specified/defined	Psychiatric Advance Directives (PAD)	No. of restraint episodes	24 months	Statistical comparison between PAD completers and non-completers	PAD completers experienced restraint & forced medication significantly less often than non-completers after 6 & 24 months.
D'Andrea et al (2013)	America	Female adolescents diagnosed with PTSD in residential treatment settings	Not specified/defined	Sports intervention (DtG)	No. of restraint episodes	10 weeks	Statistical comparison between pre/post implementation & between intervention/ control groups	DtG participants had no significant change in the frequency with which they were restrained from 10 weeks pre- to 10 weeks post-DtG, but participants in a treatment-as-usual group experienced a significant increase in restraint.
Browne et al (2011)	Australia	Adult mental health inpatient service	Mechanical	Early intervention (implementation of assessment & planning unit)	No. of restraint episodes	6 months	Descriptive data pre/post-intervention without statistical comparison between time points, or to a control group	Mechanical restraints decreased from 38 three months pre- to 17 three months post-implementation, to 5 three months later.

Authors	Country	Setting and age group	Type of restraint assessed	Intervention	Outcomes	Follow-up timescale	Study design	Findings
Sullivan et al (2005)	America (New York)	Adult inpatient psychiatric hospital	Not specified/defined	Violence Safety Program (violence assessment tool)	Restraint episodes per 1000 patient days, mean no. of patients restrained	5 years	Descriptive data pre/post-intervention without statistical comparison between time points, or to a control group	Restraint events per 1000 patient days decreased from 10.9 in 1998 to 3.2 in 2003. Chemical restraint decreased from 8.0 medications given per 1000 patient days to 6.5. Mean no. of patients receiving chemical restraint increased from 2.3 to 4.3.
E-Morris et al (2010)	America (New Jersey)	Hospital	Not specified/defined	Nursing model (specifying roles & hierarchy of nursing staff & staff training targeted according to the hierarchy)	No. of restraint episodes	9 months	Descriptive data pre/post-intervention without statistical comparison between time points, or to a control group	No. of restraints increased from 16 pre-implementation to 22 nine months post-implementation.
Ray et al (2011)	America (Chicago)	Hospital	Not specified/defined	Changes to special observations	Percentage reduction in restraint use	6 years	Descriptive data from the years 2005 to 2011 (no baseline reported)	40% decrease in restraint from the year 2005 to 2011, however baseline rates not reported.

RESULTS

The types of restraint reduction interventions employed were thematically analysed leading to the identification of five key themes which serve as an orienting schema for the discussion of findings: proactive care; organisational development; empowerment; communication and relationships; and reviewing practice (see Table 2). Due to the multi-faceted nature of the majority of the interventions described in the literature, it is not possible to tease out what aspects of the interventions were most influential on post-intervention levels of restraint. Therefore, the following subsections firstly outline a brief description of the multi-faceted interventions used and the reported influence on restraint levels, followed by the findings related to specific interventions and their impact on restraint.

Table 2: Breakdown of restraint reduction initiatives across the 60 studies reviewed.

PROACTIVE CARE	Patient activities	Puzzles Sewing Sport/Exercise Occupational Therapy	Make a photo album High tea Sensory modulation/comfort rooms Multi-purpose activity room
	Staff training	De-escalation Trauma-informed Recovery-oriented	Crisis intervention training Alternatives to restraint
	Assessment and planning	Discharge planning meetings Daily treatment plans Psychiatric advance directives Advance crisis management plans	Violence assessment and monitoring Behaviour plans Identification of restraint-prone patients Multi-disciplinary care meetings
	Specific initiatives	Medical interventions Patient massage Positive reinforcement Availability of a quiet room	Early intervention/management Restraint reduction kit Stress/anger management for patients
	Flexibility	Relaxing rules (e.g. off-unit privileges)	Less intense special observations
	Environment	Give patients a change of scenery Relocate wards to non-institutional environments Recovery-oriented environments	Play music on wards More natural light on wards More open areas on wards
ORGANISATIONAL DEVELOPMENT	Leadership	Leadership towards organisational change Strong leadership	Form a restraint reduction task force Clearly define staff roles/hierarchy
	Organisational culture	Hold open forums for staff Change employee selection process	Change employee orientation process Provide regular training
	Organisational mission, policies, and goals	Organisational goal setting Define force as treatment failure Change mission/policies to reflect commitment to recovery	Shorten interval between mandatory renewal orders Constantly monitor patient during restraint
	Changes to staffing	Change ward staff Increase nurses per shift	Introduce a dedicated inpatient psychiatrist Hire peer employees
EMPOWERMENT	Empowering staff	Staff stress reduction training Reflective space for staff Increased roles in decision-making Opportunity to develop/implement own initiatives	Open forums for staff Exploration of staff concerns Staff contest (creative alternatives to restraint) Incentive system for staff
	Empowering patients	Increased role in decision-making Increased role in treatment planning Strength-based treatment	Peer support Increased role in incident reviews
COMMUNICATION & RELATIONSHIPS	Patients and staff	Improved communication Clearly written patient rights/expectations Frequent patient checks/questions Collaborative problem solving Collaborative models of care Patients and staff going walking together	"Risk-sharing" partnerships Increased contact time Staff identification boards Positive communication from staff Recovery language Patient comment forms
	Leadership and staff	Better communication pathways Mentoring Communicate organisational goals	Regular and positive feedback to staff Regular interactions to support a working relationship
	Between staff	Staff "round tables" to discuss ideas for reducing restraint Consult each other prior to approaching patients in crisis	Accountability Multidisciplinary communication Conferences to share ideas/initiatives
	Staff training	Empathy and listening skills	Verbal skills training
REVIEWING PRACTICE	Use of restraint data	Tracking and trending incidents Data to inform practice Evaluate what works	Feedback data to staff Inform authorities
	Debriefing	Non-punitive Supportive Within 24 hours of incident	Includes patient Includes care team
	Review	Critical incident review Rapid response team review	Crisis response team

1. MULTI-FACETED APPROACHES

National Association of State Mental Health Program Directors' (NASMHPD)

six core strategies

The American organisation NASMHPD's six core strategies comprise: clear leadership towards organisational change; use of data to inform practice; workforce development including recovery-oriented environments and training; use of restraint reduction tools (e.g. comfort rooms, occupational therapy, de-escalation approaches); increased patient role; and providing vigorous, non-punitive and supportive debriefing (Huckshorn, 2004). Nine articles reported on the effect of these strategies on restraint.

Six out of the nine articles provided descriptive restraint data pre/post-intervention without statistical comparison between time points, or comparison to a control group. Out of these six studies, five reported reduced restraint, with reductions varying from 20% to 100% (Huckshorn, 2004; Lewis, Taylor & Parks, 2009; Barton, Johnson & Price, 2009; Chandler, 2012; Sarofin et al., 2012), however in one case the reduction coincided with an increase in minor injuries (Lewis et al., 2009). However, Azeem et al. (2011) reported that restraint usage amongst youths at a state psychiatric hospital increased from 20 six months pre-implementation of the six core strategies to 25 six months post-implementation.

The remaining three articles reported statistical comparison between pre/post-implementation restraint rates, two of which found a significant reduction (Putkonen et al., 2013; Wieman, Camacho-Gonsalves, Huckshorn & Leff, 2014), and one finding a non-significant 28% reduction of restraint following implementation of the six core strategies (Wale, Belkin & Moon, 2011).

No Force First

Two studies have explored the effect of Recovery Innovations' "No Force First" (NFF) policy on the use of restraint. Recovery Innovations provide mental health services across America and New Zealand, and their NFF guidelines are to:

1. Make public the NFF policy.
2. Define the use of restraint as a treatment failure.
3. Have an active program to eliminate restraint that includes: training of staff in de-escalation and the NFF process; debriefing that includes the patient; a critical incident review for any use of restraint; and tracking/trending restraint.
4. Seek to avoid the use of outpatient commitment through the use of advanced directives, active outreach, and peer support.
5. Only use involuntary inpatient treatment for individuals who present clear danger to self or others.
6. Relationships with patients are characterised by "risk-sharing" partnerships instead of "risk-management" control.
7. Design and implement, with patient input, self-directed programming including education and self-advocacy.
8. Support and assist with the training of law enforcement personnel, families and guardians in the NFF process (From Ashcraft, Bloss & Anthony, 2012).

In order to implement the NFF policy Recovery Innovations' mission and policies were changed to reflect a commitment to recovery, peer employees were hired, the staff culture was addressed (through holding open forums for staff; changing the employee selection/orientation processes; and providing regular training), and the creation of a healing environment was emphasised through the use of recovery language and delivering services in non-institutional environments

(Ashcraft et al., 2012). Ashcraft and Anthony (2008) provided a descriptive evaluation of two Recovery Innovations crisis centres (from January 2000 to October 2004). The larger of the two centres took 31 months to achieve a restraint-free month. The smaller centre achieved a restraint-free month after 15 months and decreased its yearly staff injuries from 15 to five. Within the last year prior to publication, the authors reported that there were no restraints in the past year in one of the crisis centres, and chemical restraint was administered to only 2.5% of patients. Ashcraft et al. (2012) followed this up with a further descriptive evaluation of this centre, reporting that over a two-year period 0.45% of patients received chemical restraint, and no other form of restraint was used.

Area-wide policy changes

Six out of eight studies that explored the effect of local policy changes on restraint, reported a reduction in its use. Five reported descriptive restraint data pre/post-implementation, without statistical comparison between time points or to a control group. The remaining three provided statistical comparison between pre/post-implementation restraint rates (and found significant reductions), but did not compare to a control group.

Massachusetts Department of Mental Health (DMH). In 2001, the DMH developed a state-wide initiative to reduce restraint amongst children and adolescents. Key ingredients included setting a goal to reduce restraint, requiring providers to develop plans to move toward that goal, providing technical assistance, and systematic use of data for feedback. The approach addressed: primary prevention (establishing collaborative, trauma-sensitive, strength-based models of care); secondary prevention (using early intervention techniques, proactive de-escalation and least restrictive alternatives); and tertiary prevention (preventing or reversing negative consequences

through anticipatory planning; debriefing; and patient comment forms). DMH staff provided clinical support, teaching and technical assistance and regular feedback to providers, with frequent interactions in order to support a working relationship. Two studies explored the impact of these policy changes on restraint finding significant reductions in restraint use ranging from 47.4% to 91% and significant reductions in staff and patient injuries ranging from 12% to 60% (LeBel et al., 2004; LeBel & Goldstein, 2005).

Joint Commission on the Accreditation of Healthcare Organisations (JCAHO) policy. The JCAHO policy in 2000 committed to the goal of a restraint-free environment through evaluation of ongoing leadership awareness of the use of restraint, and education of the organisation's staff regarding leadership commitment to the goal of a restraint-free environment. Two published studies explored the impact of these policy changes on restraint use, both finding significant reductions (Khadivi, Patel, Atkinson & Levine, 2004; Pollard, Yanasak, Rogers & Tapp, 2007), however in one study assaults on staff and patients also significantly increased (Khadivi et al., 2004).

The Revised Finnish Mental Health Act (1990, 2002). The 1990 revision of the Finnish Mental Health Act stated that restraint was only allowed if the patient was being treated on an involuntary basis. In 2002, hospitals were also required to report restraints to the authorities and to immediately notify legal representatives of the patients if they were mechanically restrained for more than eight hours. Two studies reported on the effects of these changes on restraint use in Finland, both finding non-linear declines over several years (Keski-Valcama et al., 2007; Ulla, Maritta & Riittakerttu, 2012).

Health Care Financing Administration (HCFA) Guidelines 1999. HCFA guidelines required that a physician made a face-to-face assessment of a patient within one hour of restraint initiation. The rules shortened the interval between mandatory renewal orders, codified requirements for staff training, and created more stringent requirements for documentation. Sees (2009) reported on the effect of the new guidelines on a locked psychiatric unit in Minneapolis. The number of patients restrained significantly decreased from 226 two years pre-implementation to 106 two years post-implementation.

Servicio Andaluz de Salud (2010) Policy. In Spain, a regulatory protocol was implemented in 2005 (and updated in 2010) by the Health Authorities in Andalusia. In relation to mechanical restraint this protocol made it mandatory for wards to register each episode and analyse restraint-related data, to only use restraint for a maximum of four hours, and to constantly monitor the patient during restraint. The number of patients restrained on an adult psychiatric ward where this protocol was implemented reduced from 100 one year pre-implementation to 82 seven years post-implementation (Guzman-Parra et al., 2014). However, the total number of restraints increased from 148 to 164.

Other multi-faceted approaches (at individual sites/organisations)

A further 16 studies evaluated the use of multi-faceted interventions at individual sites/organisations. Seven did not report statistical comparison between pre/post-implementation, or compare intervention groups to control groups, but all provided positive descriptive data on the success of the interventions. Markwell (2005) found a 51% reduction in restraint following an intervention comprising: the formation of a restraint reduction task force; a staff contest (whereby staff entered suggestions for alternatives to restraint which were distributed to all staff); production

and distribution of a restraint reduction kit; and ongoing staff training on alternatives to restraint.

Smith et al. (2005) reported a reduction in mechanical restraints from 6.4 episodes per 1000 patient days in 1991 to 1.2 in 2000 in Pennsylvania state hospitals over a period when the Pennsylvania state hospital system experienced multiple changes to: leadership, advocacy efforts, policy changes, psychiatric emergency response teams, unit size, patient-to-staff ratios, incident management, second-generation antipsychotics, and the quantity and quality of treatment. LaFond (2007) later reported a 54% decrease in restraint incidents following interventions which began with the premise that restraint is a treatment failure not a treatment option, and continued with the implementation of informal and formal post-restraint debriefing processes, the improvement of nursing assessments and staff undergoing crisis intervention training. In the same year Witte (2007) published further positive descriptive results which showed a 98% reduction in restraint incidents following the formation of a task force, redesigning of paperwork for crisis situations, staff verbal skills training, development of daily treatment plans, staff consulting with each other prior to approaching a patient in crisis, changes to unit routine, and increased staff reflection on their interactions with patients.

In the following year, Sclafani et al. (2008) reported on the elimination of restraint in mental health services following an intervention which focused on identifying and working with patients who experienced high levels of restraint, and working with unit staff to develop modified ward structures and routines. The interventions focused on patients as people by building and using emotional relationship contacts with both ward staff and patients, and involved staff training,

ward meetings, person-centred approaches, positive reinforcements, and strength-based treatment.

Beezhold et al. (2010) reported a 28% decrease in restraints (compared to a 12% decrease on a control ward) following the introduction of a dedicated inpatient psychiatrist, replacement of weekly ward rounds with daily multidisciplinary care and discharge planning meetings, and the promotion of increased roles for nursing staff in decision-making and patient contact.

Sivakumaram, George and Pfukwa (2011) also reported a reduction in the number of restraints (presented graphically) following changes to the physical environment (e.g. more natural light, more open areas, multi-purpose activities room); leadership initiatives (e.g. better communication pathways; provision of mentoring and support; de-escalation training; accountability and debriefing); multidisciplinary staff involvement; treatment-related factors and documentation changes.

Di Lorenzo, Miani, Formicola and Ferri (2014) reported yearly decreases in the use of mechanical restraint on a psychiatric ward in Italy over eight years (2005-2012) which coincided with changes in ward staff, an increase in the number of nurses per shift, ward relocation, and more restricted guidelines for restraint application. In the same year, Espinosa et al. (2014) also reported a 96% reduction in the number of mechanical restraints at a large medical centre comprising inpatient psychiatric services for children, adolescents and adults, following the development of an interdisciplinary milieu improvement council which conducted a literature review; staff training according to the findings of the review; and staff being asked to write recommendations which were then incorporated over three years (changes included: written and easily accessible schedules of activities; unstructured time being filled with activities e.g. high tea; staff identification photo boards; frequent reminders for

staff to prioritise time interacting with patients; clearly written rights and expectations for patients; avoiding criticism, hostility and over-involvement; emphasis on positive communications; taking vital signs after patients were awake instead of taking them at 6am; and the introduction of comfort rooms).

The remaining eight studies provided statistical comparisons between pre/post-implementation restraint rates, with five showing statistically significant reductions in restraint ranging from 39% to 99% (D'Orio, Purselle, Stevens & Garlow, 2004; McCue et al., 2004; Jonikas et al., 2004; Borckhardt et al., 2011; Godfrey et al., 2014). Interventions employed included various elements such as: development of crisis response teams; identification of restraint-prone patients; staff training/education in the prevention and management of aggression, de-escalation, alternatives to restraint, trauma-informed care; staff being taught that restraint was only to be used as a last resort; patient education (stress/anger management); daily reviews of restraints; provision of feedback and quality monitoring; incentive systems for staff; unique advance crisis management plans; changes in rules and language; policy changes requiring prior approval for the use of mechanical restraint; patient involvement in treatment planning; and changes to the physical environment. However, only one of these studies assessed the individual contribution of specific elements of the multi-faceted interventions to the reduction of restraint, reporting that only changes to the physical environment were uniquely associated with significant reductions in restraint (Borckhardt et al., 2011).

McCue et al (2004) found a significant increase in patient-to-staff assaults; however, Godfrey et al. (2014) reported no significant increase in assaults or injuries, Furthermore, whilst not finding a statistically significant reduction in restraint, Hellerstein, Staib and Lequesne (2007) reported a significant decrease in patient-

related staff injuries following their multi-faceted intervention which involved restricting the length of restraint to two hours; staff education; staff discussions around alternatives to restraint; improved communication between staff and patients; relaxed practice regarding off-unit privileges; and the use of a coping questionnaire to assess patient preferences for dealing with agitation.

The final two studies showed less positive results. Bowers et al. (2006) evaluated an intervention at two psychiatric wards in London. The intervention was based on a model whereby psychiatric philosophy, moral commitments, cognitive-emotional self-management, technical mastery, teamwork, and organisational support were thought to lead to: compassion, emotional equilibrium, and effective structure; which were then thought to decrease restraint use. The exact details of the intervention, however, were not provided. Mean numbers of restraints per shift did not significantly reduce from a three month baseline period to the year the implementation occurred. A follow-up evaluation (Bowers, Flood, Brennan & Allan, 2008) found that chemical restraint decreased by 21% and physical restraint by 46% on three intervention wards, but did not significantly differ from five control wards.

2. SPECIFIC INTERVENTIONS

Staff and/or patient training

Five studies explored the impact of training for patients and/or staff on restraint use in mental healthcare, with largely positive results. Three reported descriptive restraint data pre/post-training without statistical comparison between time points or to a control group, one reported statistical comparison between pre/post-training restraint rates, and one also included a control group.

Mindfulness-based stress reduction (MBSR) training for staff. Hallman, O'Connor, Hasenau and Brady (2014) explored the impact of four MBSR training

classes for staff from a child and adolescent psychiatric unit in Michigan. Training topics included: waking up from autopilot, body scanning, refraining from judgement, using breathing as a stress reliever and befriending yourself. Restraints decreased from 30 (over eight weeks pre-training) to 10 (over eight weeks post-training).

De-escalation and restraint training for staff. Laker, Gray and Flach (2010) explored the effect of de-escalation and restraint training on restraint incidents on a PICU in the UK. Training on an intervention to manage violence and aggression was rolled out across the NHS Trust in 2006. The number of chemical restraints increased from 45 six months pre-training to 51 six months post-training, however the proportion of patients chemically restrained (non-significantly) reduced from 39% to 36%. Physical restraints slightly increased from 89 to 91 but the proportion of patients physically restrained significantly reduced from 79% to 66%.

Trauma-informed training for patients and staff. Chandler (2008) evaluated the effect of trauma-informed training on restraint in an American psychiatric unit. For patients, cognitive-behavioural therapy and dialectical-behavioural skills training was offered daily and a resource room was made available which contained literature on diagnosis and coping skills, written exercises, and various media to assist in managing symptoms. Staff were educated on the adverse effects of post-traumatic stress disorder (PTSD) on familial, social and occupational functioning. There was a linear decline in restraint use yearly from 2003 to 2008, falling from 26 restraints to three.

Non Violent Crisis Intervention Program (NVCIP) training for staff. Moore (2008) reported on the impact of NVCIP training on restraint use at three mental health units in New Jersey (a child and adolescent unit, an adolescent unit, and an adult unit). The NVCIP training manual promotes the effectiveness of empathy,

while helping individuals recognise the assessment and listening skills necessary to be empathetic. Moore (2008) reported a 40% reduction in restraint in the year following training (2007), and a further 30% reduction in the first quarter of 2008.

eLearning for staff. Kontio et al. (2014) explored the impact on mechanical restraint of an eLearning course for staff consisting of various modules (legal and ethical issues, behaviour-related factors, therapeutic relationship and self-awareness, teamwork and integrating knowledge with practice). In a cluster randomised trial at a psychiatric hospital in Finland, Kontio et al (2014) found that eLearning did not lead to significant reductions in the number of mechanical restraints.

Collaborative Problem Solving (CPS)

CPS is a cognitive-behavioural approach that focuses on how adults interact with children in managing a child's behaviour. The CPS model views aggressive behaviour as the result of lagging cognitive skills in flexibility, frustration tolerance and problem-solving. CPS is based on the idea that thinking deficits occur prior to aggressive behaviour, and that staff/parents need to teach children to solve problems during times of frustration or stress. Four studies have explored the impact of CPS on restraint, with all reporting positive results. Three studies found statistically significant reductions in restraint (Greene, Ablon & Martin, 2006; Regan, Curtin & Vorderer, 2006; Jani, Knight & Jani, 2011), two of which also reported significant reductions in staff and patient injuries (Greene et al., 2006; Regan et al., 2006) from pre- to post-implementation. One further study reported a reduction in restraints from 263 to seven over four years, without statistical comparison between time points (Martin et al., 2008).

Sensory Modulation

Sensory modulation refers to the capacity to regulate and organise responses to sensory input in an adaptive manner to adapt to challenges (e.g. Miller et al., 2001; Chalmers et al. 2012). Sensory modulation approaches involve the provision of sensory-based therapy tools and/or the creation of appropriate environments that engage the user's senses to reduce the build-up of agitation and prevent the escalation of aggression (e.g. Chalmers et al., 2012; Lee et al., 2010). Two studies have explored the effect of these approaches on restraint in mental healthcare, both finding significant reductions. Teitelbaum et al. (2007) evaluated the initiation of the Snoezelen room, a high-tech multisensory environment that included music, light or fibre optic strands, calming image projections, vibrations of bubble tubes and soothing smells. A statistically significant reduction in the number of restraints was found in an intervention unit compared with a control unit. Likewise, Cummings, Grandfield and Coldwell (2010) found a significant reduction in the frequency and duration of restraint events over a nine-month period at an acute psychiatric facility for children and adults with the addition of a room with a multisensory reclining chair, an entertainment centre, calming music, books, puzzles, weighted blankets, stress balls and magazines.

Behavioural Interventions

Two studies have reported on the impact of behavioural interventions on restraint in mental healthcare. These interventions comprised the implementation of behaviour plans based on assessments of target behaviours (identification of behaviours, events predicting behaviours, maintaining factors, skills training strategies) and the use of reinforcers to decrease problematic behaviours and increase appropriate ones. Bisconer, Green, Mallon-Czajka and Johnson (2006) evaluated the

use of a behaviour plan implemented at an American psychiatric hospital. From three months pre- to 39 months post-implementation there was an overall decrease in the frequency of restraints, PRN medication and staff injuries. Likewise, Dean, Duke, George and Scott (2007) found a significant reduction in the number of physical restraints and the number of staff and patient injuries from six months pre- to six months post-implementation of a behavioural management program in a child and adolescent mental health unit. Episodes of physical restraint reduced from a mean of 23.3 per month to 4.0, and injuries reduced from a mean of 3.5 per month to 0.7.

Medical interventions

Two studies described how medical interventions reduced restraint use, with one citing reduced PRN medications and the other citing reduced physical restraint. However, it could be argued that such interventions are forms of chemical restraint in themselves. Childs and Price (2007) explored the effect of daily cranial electrotherapy stimulation treatment over three months on violent neuropsychiatric patients in a maximum security hospital in Texas. They reported a statistically significant 40% reduction in episodes of an unspecified form of restraint, and a statistically significant 42% reduction in the use of PRN medications. In the same year Pascual et al. (2007) published an article outlining the effects of olanzapine on agitated psychotic patients at an emergency psychiatric service in Spain. Patients received either 20mg olanzapine or conventional oral therapy. Thirty percent of patients required physical restraint pre-medication, which decreased throughout the six hour study period in both groups. At the final time point, only five patients treated with olanzapine (13%) and nine patients (22%) treated with standard therapy were restrained.

Use of restraint data for monitoring and feedback

Two studies have shown that monitoring the use of restraint can reduce chemical restraint use in mental healthcare. Damsa et al. (2006) explored the effect of an observational study on the use of intramuscular injections in a psychiatric ED in Switzerland. They observed a statistically significant 27% decrease in the number of injections in the three-month observational period compared to the previous three months. Likewise, Friedman, Nurenberg, Birnbaum and Schleifer (2012) examined whether providing teams with weekly uses of PRN psychotropic medications, would impact on its use at an American psychiatric hospital. From September 2008 to December 2010 total monthly administrations decreased from 642 to 240. Statistically significant decreases were found yearly, monthly and weekly.

Post-incident review

Prescott et al. (2007) reported on the impact of a rapid response team on restraint use at a psychiatric hospital for adults, adolescents and children. Members of the response team would meet within 24 hours of mechanical restraint with the patient's care team and assess what could be done to prevent re-occurrence. The number of mechanical restraints decreased by 36.4% (from 77 to 49 three weeks pre- to post-implementation). The number of patients mechanically restrained declined by 12% (25 to 21). The number of physical restraints decreased by 44.3% (79 to 44), and the number of patients physically restrained decreased by 21.4% (28 to 22).

Legal frameworks

In North Carolina, Psychiatric Advance Directives (PADs) provide a legal means for competent individuals to refuse or consent to future mental health treatment during periods of decisional incapacity. The PAD consists of a semi-structured guided discussion of treatment decision-making and planning for future mental health

treatment. PAD completers are given a PAD identification card and a stainless steel bracelet or necklace engraved to indicate that they have a PAD and how to access it. Swanson et al. (2008) reported that PAD completers in North Carolina experienced restraint and forced medication significantly less often than non-completers did after six and 24 months.

Sports interventions

D'Andrea, Bergholz, Fortunato and Spinazzola (2013) explored the impact of 'Do the Good' (DtG), a trauma-informed sports program, on female adolescents diagnosed with PTSD in residential treatment settings. DtG is guided by building secure attachments; developing competency; and self-regulating the achievement of goals. Coaches are taught to: provide specific, behaviourally-linked praise when a behaviour occurs; spend time one-on-one with each player; and to use "circle-ups" to provide specific expectations for behaviours and game strategy. Coaches facilitate skills through four therapeutic goal modules: "play to the whistle" (perseverance, putting aside frustration while pursuing a goal), "show up" (commit to one's best possible performance, awareness of emotional reactions to distress), "build your team" (leadership skills and responsibility-taking), and "fill the tank" (provide support for one another). Participants played an hour-long basketball game once a week against a competing residential treatment facility over a five-month season. DtG participants had no significant change in the frequency with which they were restrained from ten weeks pre- to ten weeks post-DtG, but participants in a treatment-as-usual group experienced a significant increase in restraint.

Early Intervention

Browne et al. (2011) reported on the implementation of a psychiatric assessment and planning unit at an Australian adult mental health inpatient service.

The unit was staffed by a multidisciplinary team and allowed patients and families to access medical staff earlier in their care instead of having to wait long periods in the ED for admission. The unit provided intense management in the first 48 hours of arrival, including assessment by consultant psychiatrists and the implementation of management plans. Mechanical restraints decreased from 38 three months pre-implementation, to 17 three months post-implementation, to five three months later.

Violence assessment and planning

The Violence Safety Program, implemented within an adult inpatient psychiatric hospital in New York, included the implementation of a violence assessment tool which detailed past violence history, behaviours which manifest violence, and interventions the patient might find helpful (commonly used interventions were talking to or walking with staff, use of time out/quiet room, decreased stimulation). The program involved regular monitoring of rates of restraint, and reviews of restraint events. Sullivan et al. (2005) reported that restraint events per 1000 patient days decreased from 10.9 in 1998 to 3.2 in 2003. The use of chemical restraint decreased from 8.0 medications given per 1000 patient days to 6.5. However, the mean number of patients receiving chemical restraint increased from 2.3 to 4.3.

New nursing leadership structure

E-Morris et al. (2010) described the implementation of a nursing model at a hospital in New Jersey, which specified the roles and hierarchy of different levels of nursing staff. A nursing leadership group developed and distributed a manual outlining the hierarchy, and planned and conducted ongoing training that was targeted to the roles of the different levels of staff. The number of restraints *increased* from 16 pre-implementation to 22 nine months post-implementation.

Changes to special observations

Ray, Perkins, and Meijer (2011) reported on a nursing intervention whereby changes were made at a hospital in Chicago in the use of special observations (i.e. when a staff member is assigned to watch a patient to prevent violence directed towards self or others). A multi-disciplinary committee explored alternatives to intensive observation and decided that patients would benefit from having a staff member assigned to them to be available at all times to discuss disturbing thoughts/feelings that could lead to suicidal thoughts. The committee developed a tool consisting of an agreement between the nurse and patient that stated that the staff member would be available to talk with them at all times, and what thoughts/feelings the patient should share with the staff member. The tool asked the patient/staff member to identify any objects in the patient's room which the patient might have thoughts of injuring themselves with and to list activities that could help the patient cope with self-injurious impulses. Individualised care plans were created, which offered a customisable choice of nursing interventions. There was a 40% decrease in restraint from the year 2005 to 2011, however they did not report baseline rates.

Summary

Numerous restraint-reduction initiatives have been employed in mental healthcare settings from 2004 to 2014. Table 2 outlines the breakdown of the individual aspects of the initiatives described across the 60 studies reviewed, themed into five broad categories: proactive care; organisational development; empowerment; communication and relationships; and reviewing practice.

Discussion

Whilst considered to be necessary at times in order to maintain safety, the use of restraint in mental healthcare can have numerous negative psychological, physical

and financial consequences that have led to international cries for restraint reduction. Pressure is increasingly being put on mental healthcare providers to design and implement restraint reduction interventions, but detailed guidance on best ways of doing this has been lacking. Whilst reviews have previously been conducted on specific areas of restraint reduction, an up-to-date systematic review of restraint reduction studies across mental healthcare has been lacking until now.

Sixty studies were identified, with the majority conducted in America, and the majority reporting on the impact on mechanical restraint. The lack of studies reporting on the effects of interventions on other types of restraint represents a concerning gap in the literature and leaves countries like the UK, where mechanical restraint is not routinely used, without sufficient evidence-based guidance. Whilst it may seem that America is leading the way in restraint reduction, many of the initiatives have focused on reducing mechanical restraint which has been long discredited in the UK and are therefore not helpful to those NHS Trusts trying to implement Department of Health guidance (DH, 2014). The reported large variations in types and durations of restraint use both within and between countries has raised concerns that the use of restraint is strongly associated with culture, traditions and policies (Keski-Valkama et al., 2007).

There were numerous definitional limitations observed in the review process. In particular, there was an inconsistency in the use of terms, with physical restraint and mechanical restraint being used inconsistently and interchangeably. The majority of papers did not specify or define which type of restraint they had targeted/assessed, and a number of studies combined different types of restraint in outcome reporting making it impossible to tease out whether interventions are effective in reducing all types of restraint or only specific types. Inconsistency in outcome measures was also rife, making it difficult to compare and amalgamate findings. There was also huge

variety in follow-up time scales, ranging from six hours to 14 years. Fourteen of the studies had a follow-up timescale under a year, which is particularly concerning for evaluations of culture change as the effect is not likely to be seen in the short-term. Limitations inherent within the conduct of the review also warrant consideration. Studies written in a non-English language were not able to be included and although all steps were taken to access full-texts, this was not possible for some potentially relevant articles. Due to time and funding constraints we were not able to explore the complementary body of knowledge related specifically to seclusion.

The vast majority of the interventions were multi-faceted, which has elsewhere been argued to be the best approach to restraint reduction (e.g. Bowers 2014; Bowers et al., 2014). But by simultaneously employing multiple initiatives, it is not possible to tease out which aspects are effective in restraint reduction. Out of the studies which evaluated the implementation of specific interventions the majority explored the impact of staff and/or patient training on restraint, with MBSR, trauma-informed and NVCIP training associated with restraint reductions. Four studies found that CPS was associated with a reduction in restraint (with two reporting a statistically significant reduction), two showed significant reductions following sensory modulation, two showed a reduction following the implementation of behavioural interventions, and two showed a reduction following medical interventions.

Whilst an overwhelming majority reported a reduction in restraint, findings also highlighted the importance of considering the impact on injury. Although nine studies reported decreases in staff and/or patient injuries from pre- to post-intervention, two reported an *increase* in injuries which shouldn't be taken lightly. In any restraint reduction intervention we need to do all we can to ensure we are not

increasing risk of harm to staff and patients. This is an essential outcome for any future restraint reduction evaluation.

Whilst there is a large body of research exploring the success of restraint reduction interventions, there are clear gaps in the literature which need to be addressed. More studies need to assess the effect of interventions on physical and chemical restraint; authors need to clarify which type of restraint they are assessing and how they are defining it; and more robust methodologies need to be employed, as the majority only reported pre/post descriptive data without statistical or control group comparison, with only one out of the 60 studies having conducted an RCT. Whilst there is presently a clear divide between the numbers of published studies coming out of America compared to the rest of the world, this is likely to change in the coming years. Although few of the identified studies have been from the UK, various initiatives are currently underway in a number of NHS Trusts in response to Department of Health (2014) guidance. For example, the Cambridgeshire and Peterborough NHS Foundation Trust are conducting a Trust-wide initiative called PROMISE which will involve qualitative and quantitative research strands that will inform the development of a proactive care toolkit. The success of this toolkit in reducing restraint will then be evaluated. Likewise, the Mersey Care NHS Trust have developed and piloted a restraint reduction initiative, with pilot wards showing reductions in both physical and chemical restraint.

Shortly following completion of the present review a landmark UK study was published (Bowers et al., 2015). This work was ongoing whilst the review was being conducted and two publications related to the Safewards Model were identified in the review process (Bowers, 2014; Bowers et al., 2014), but were excluded due to a lack of pre/post restraint outcome data (these publications comprised the presentation of

the Safewards Model and the literature supporting its development). In 2015 Safewards was referred to in UK National Institute for Health and Care Excellence (NICE) guidelines, and Bowers et al. (2015) published the results of a large scale cluster RCT which did provide restraint outcome data. Ten ‘Safewards’ interventions were implemented across 31 adult psychiatric wards (see www.safewards.net for details of these interventions), and overall ‘containment’ (which included rates of physical and chemical restraint) reduced by 26.4% on intervention wards. Unsurprisingly due to increasing political movements towards restraint reduction, this is a rapidly growing area and the following years will most likely see the publication of further UK evaluations of initiatives in peer-reviewed academic journals.

Whilst the present review does highlight the presence of some evidence-based interventions that will be informative to mental healthcare providers striving to reduce restraint, this is an area that demands further research to fill the knowledge gaps identified. This research is needed not only because of political pressure to reduce restraint internationally, but because we as mental healthcare providers should be striving towards more humane mental healthcare in our services, and restraint does not fit well with the core values of care and compassion which are at the heart of frontline service delivery. Even when restraint may be argued to have taken place out of necessity in order to maintain safety, it is still worth reflecting on opportunities prior to the incident where appropriate interventions might have altered the final outcome and the need for physical intervention.

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